

CLAIMS

1. A laser drilling method for carrying out drilling by irradiating a workpiece with a laser beam from a laser oscillator, wherein said laser beam is projected traveling through a polygon mirror, a mask having a mask pattern including a plurality of holes for defining a processing pattern, at least one galvano-mirror, and a processing lens, said polygon mirror sweeps said laser beam so that said laser beam scans across the plurality of holes in said mask to thereby forming a plurality of holes into said workpiece, and an irradiation region of said laser beam onto said workpiece is shifted in one axis direction by said at least one galvano-mirror.

2. The laser drilling method according to claim 1, wherein two galvano-mirrors are provided, and the irradiation region of said laser beam onto said workpiece is shifted by one of the galvano-mirrors in one axis direction while the irradiation region of the laser beam onto said workpiece is shifted by other one of the galvano-mirrors in the direction which is orthogonal to said one axis direction.

3. A laser drilling method for carrying out drilling by irradiating a workpiece with a laser beam from a laser oscillator, wherein said laser beam is projected traveling through a shaping optical system for shaping the laser beam into a line or rectangle, a polygon mirror, a mask having a mask pattern including a plurality of holes for defining a processing pattern, at least one galvano-mirror, and a processing lens, said polygon mirror sweeps said laser beam so that the laser beam scans across the plurality of holes in said mask to thereby collectively forming a plurality of holes into said workpiece, and an irradiation region of said laser beam is shifted in one axis direction by said at least one galvano-mirror.

4. The laser drilling method according to claim 3, wherein two galvano-mirrors are provided, and the irradiation region of said laser beam onto said workpiece is shifted by one of the galvano-mirrors in one axis direction while the irradiation region of said laser beam onto said workpiece is shifted by other one of the galvano-mirrors in the direction which is orthogonal to said one axis direction.

5. The laser drilling method according to either claim 3 or 4, wherein, by arranging a masking mechanism in an optical path between said laser oscillator and said mask, the irradiation of said laser beam is avoided during shifting the irradiation region of said laser beam.

6. A laser drilling apparatus for carrying out drilling by irradiating a workpiece with a laser beam from a laser oscillator, wherein:

a polygon mirror, a mask having a mask pattern including a plurality of holes for defining a processing pattern, at least one galvano-mirror, and a processing lens are arranged between said laser oscillator and said workpiece, the laser beam from said laser oscillator being projected onto said workpiece traveling through these components,

said polygon mirror sweeps said laser beam so that the laser beam scans across the plurality of holes in said mask to thereby forming a plurality of holes into said workpiece, and

an irradiation region of said laser beam is shifted in one axis direction by said at least one galvano-mirror.

7. The laser drilling apparatus according to claim 6, wherein two galvano-mirrors are provided, and the irradiation region of said laser beam onto said workpiece is shifted by one of the galvano-mirrors in one axis direction while the irradiation region of said laser beam onto said workpiece is shifted by other one of the galvano-mirrors in the direction which is orthogonal to said one axis direction.

8. A laser drilling apparatus for carrying out drilling by irradiating a workpiece with a laser beam from a laser oscillator, wherein:

a shaping optical system for shaping said laser beam into a line or rectangle, a polygon mirror, a mask having a mask pattern including a plurality of holes for defining a processing pattern, at least one galvano-mirror, and a processing lens are arranged between said laser oscillator and said workpiece, the laser beam from said laser oscillator being projected onto said workpiece traveling through these components,

said polygon mirror sweeps said laser beam so that the laser beam scans across the plurality of holes in said mask to thereby collectively forming a plurality of holes into said workpiece, and

an irradiation region of said laser beam is shifted in one axis direction by said at least one galvano-mirror.

9. The laser drilling apparatus according to claim 8, wherein two galvano-mirrors are provided, and the irradiation region of said laser beam onto said workpiece is shifted by one of the galvano-mirrors in one axis direction while the irradiation region of said laser beam onto said workpiece is shifted by other one of the galvano-mirrors in the direction which is orthogonal to said one axis direction.

10. The laser drilling apparatus according to either claim 8 or 9, wherein a masking mechanism is arranged in an optical path between said laser oscillator and said mask to avoid the irradiation of said laser beam during shifting the irradiation region of said laser beam.